

REMARKS

Claims 1-20 are pending, with claims 1, 11 and 18 being independent. Claims 8 and 9 have been withdrawn. Claims 2, 7 and 8 have been amended. Claims 10, 11 and 18-20 have been added. No new subject matter has been added. Applicant respectfully requests reconsideration of the claims in view of the following remarks.

Restriction

Applicant reiterates the traverse of the restriction of originally filed claims 8 and 9. As explained in the previously-filed Election, this restriction is improper. To move prosecution forward, Applicant has added method claim 11, which is clearly not restrictable under PCT Rules 13.1 and 13.2 (and is clearly a linking claim under U.S. practice). Claims 8 and 9 now depend from claim 11 so that allowance of claim 11 will lead to allowance of claims 8 and 9 (as well as newly added claims 12-17).

Prior art rejection

Claims 1-7 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Kojima, et al. (U.S. Patent No. 4,906,885, hereinafter “Kojima”) in view of “Mechanical Tests of Free-Standing Aluminum Microbeams for MEMS Application” (pages 1-11, hereinafter “Zhang”). Applicant respectfully traverses this rejection.

Applicant respectfully submits that the claims are allowable as originally filed. Claim 1, specifically recites an electronic device that comprises a free-standing thin film comprising an alloy of aluminum and at least magnesium. It is respectfully submitted that the prior art does not teach or suggest the limitations of claim 1.

Kojima describes a surface acoustic wave (SAW) device wherein electrodes, forming an interdigitated transducer (IDT), are placed on a substrate. According to Kojima, the electrodes are made of an alloyed material consisting of aluminum, copper and magnesium. A SAW device would not function if the electrodes are not physically contacting the substrate.

The object of Kojima is to provide “a high-power, long-life surface acoustic wave device.” Kojima discusses that “conceivable causes of limiting the life of SAW filters include electrical migration, effects similar to thermal migration, and acoustic migrations” (column 2, lines 29-31). The entry of an electrical signal to a SAW filter creates a stress on the substrate due to the inverse piezoelectric effect, and the stress distorts the IDT electrode formed on the substrate, yielding hillocks and voids. In other words, Kojima is concerned about effects that result from electrodes contacting the substrate.

However, the present invention does not concern a SAW device comprising a thin film on a substrate. The present invention concerns a free-standing thin film. It is an object of the present invention to improve the lifetime of free-standing thin films. The effects that limit the lifetime of a free-standing thin film are completely different from the migration processes which limit the lifetime of a SAW device. The lifetime of a free-standing thin film is mostly limited by mechanical stresses that cause creep and as a long term effect permanently deform the device. Kojima does not suggest that an alloy of Al-Mg is less sensitive to creep.

Zhang also discusses free-standing thin films. Zhang explicitly describes that “the mechanical behavior of a free-standing thin film is expected to be different from that of [...] a conventional thin film on a substrate” (page 2, lines 1, 2). In a free-standing thin film the grain size is typically very small and the absence of a substrate leads to both its top and bottom surfaces being unconstrained. These microstructural characteristics may result in unique

mechanical properties of a free-standing thin film. Accordingly, one skilled in the art would not combine the prior art known from Kojima which discusses a thin film on a substrate with the prior art as described by Zhang.

The Office Action concludes that it would have it would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed the aluminum alloyed with Cu and Mg of Kojima into a free standing thin film as taught by Zhang. Applicant respectfully submits that such a modification would lead to a completely non-functional device. Kojima's SAW could never operate with free-standing electrodes and, therefore, such a modification is clearly not possible.

It is therefore respectfully submitted that claim 1 is allowable over the prior art.

Claims 2-7 and 10 depend from claim 1 and add further limitations. It is respectfully submitted that these claims are allowable over the references of record in view of their dependence on an allowable claim as well as the additional limitations.

Claims 10-20 have been added herein. No new matter has been added. It is respectfully submitted that each of these claims is also allowable over the references of record. For example, claim 11 recites a "forming a free-standing thin film [that comprises] ... an alloy of aluminum and at least magnesium" and claim 18 recites a MEMS device with a second electrode that comprises "a free-standing thin film comprising an alloy of aluminum and at least magnesium." The prior art does not teach or suggest these claims.

Conclusion

Applicant has made a diligent effort to place the claims in condition for allowance. However, should there remain unresolved issues that require adverse action, it is respectfully requested that the Examiner telephone Ira S. Matsil, Applicant's attorney, at 972-732-1001 so

that such issues may be resolved as expeditiously as possible. The Commissioner is hereby authorized to charge any fees that are due, or credit any overpayment, to Deposit Account No. 50-1065.

Respectfully submitted,

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Date

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